① Multiply $(2x+3)(5x-4)$

② Factor $x^2+14x+45$

③ Find the minimum $y=2x^2+4x+12$

④ Solve for x, $3(x-2)^2=27$

$2x + 3$

$5x$	$10x^2$	$15x$
-4	$-8x$	-12

$10x^2 + 7x - 12$

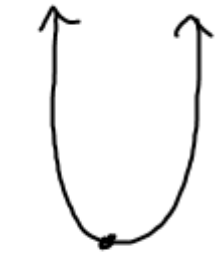
$x^2 + 14x + 45$

1·45
3·15
5·9

$(x + 5)(x + 9)$

③ Find the minimum $y = \underset{a}{2}x^2 + \underset{b}{4}x + \underset{c}{12}$

(vertex)



$$x\text{-coord.} = \frac{-b}{2a} = \frac{-4}{2(2)} = \boxed{-1}$$

$$y\text{-coord} = 2(-1)^2 + 4(-1) + 12$$

$$2 + -4 + 12 = \boxed{10}$$

vertex
minimum
(-1, 10)

④ Solve for x,

$$\frac{3(x-2)^2}{3} = \frac{27}{3}$$

$$\sqrt{(x-2)^2} = \sqrt{9}$$

$$x-2 = \pm 3$$

$$+2 \quad +2$$

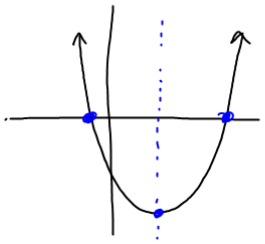
$$x = 5, -1$$

Three Forms

Polynomial: ax^2+bx+c

vertex: $a(x-h)^2+k$

Factored: $a(x-R_1)(x-R_2)$



Vertex

Polynomial

x-coord $= \frac{-b}{2a}$

y-coord = plug x-value back in eq.

Example

$y=2x^2+4x+12$

$x=\frac{-b}{2a}=\frac{-4}{2(2)}=-1$

$y=2(-1)^2+4(-1)+12$

vertex $(-1, 10)$

Vertex

$h=x$-coord. (think opposite)

$k=y$-coord.

Example

$y=2(x-3)^2+4$

vertex $(3,4)$

$y=3(x+2)^2-5$

vertex $(-2,-5)$

Factored

x-coord. = avg of the x-int

y-coord = plug x into eq.

Example

$y=4(x-4)(x+2)$

x-int $4, -2$

x-coord $\frac{4+-2}{2}=1$

y-coord $y=4(1-4)(1+3)$

$=-48$

vertex $=(1,-48)$

x-intercepts / roots / zeros / solutions

Polynomial

1. Factor it
2. set $y=0$
3. solve for x

(Think opposite)

$y = x^2 + 8x + 15$

$0 = (x+3)(x+5)$

$x = -3, -5$

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vertex

1. Set $y=0$
2. Solve for x

$y = 3(x-2)^2 - 27$

$0 = 3(x-2)^2 - 27$

$+27 \qquad +27$

$\frac{27}{3} = \frac{3(x-2)^2}{3}$

$9 = (x-2)^2$

$\sqrt{9} = \sqrt{(x-2)^2}$

$\pm 3 = x - 2$

$+2 \qquad +2$

$x = 5, -1$

Factored

1. Set $y=0$
2. pull out answers (think opposite)

$y = 4(x-3)(x+2)$

$0 = 4(x-3)(x+2)$

$x = 3, -2$

HW Quadratics 1

Turn in
5.4 #7-45 (10)